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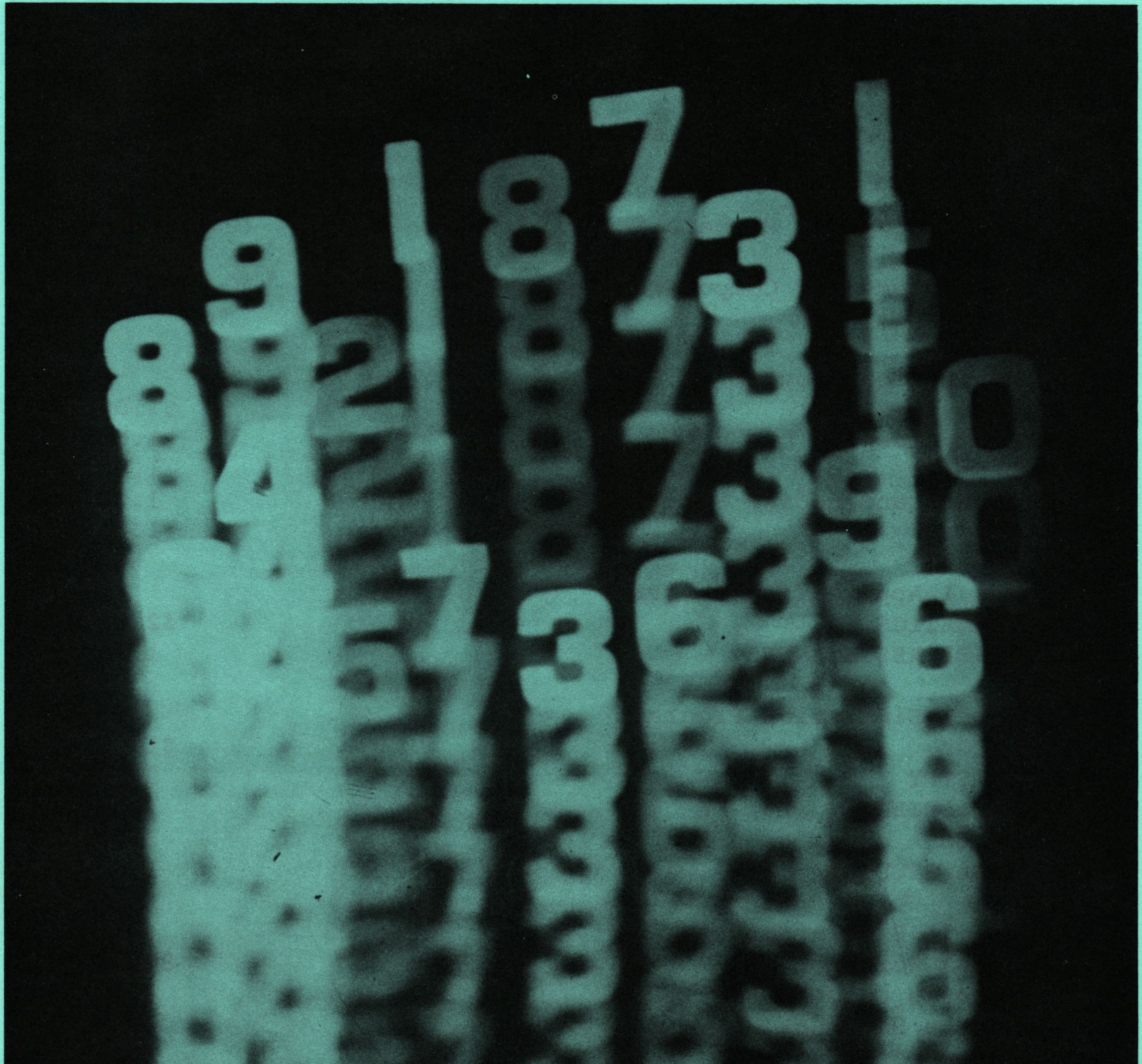

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STUDENT MANUAL

SURVEY ANALYSIS PACKAGE

SAP

Developed By:

Daniel Klassen
State University of New York
Stony Brook, New York

Support Material By:

Elizabeth A. Williamson
Northwest Regional Educational Laboratories
Portland, Oregon

Programmed By:

Stuart Hollander
State University of New York
Stony Brook, New York

HUNTINGTON TWO COMPUTER PROJECT

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SAP

STUDENT MANUAL

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I. INTRODUCTION TO THE *SAP* UNIT

In 1957, a group of social scientists from Purdue University released the findings of a comprehensive study of the American teenager. They found some interesting results. According to the study, "....over half the teenagers in America believe that

- Most people aren't capable of deciding what's best for themselves.
- Politics is over their heads, and besides it's a dirty game run by unscrupulous insiders.
- We should help federal and local police maintain obedience by legalizing wiretapping and the third degree.
- We should put censorship of books, movies, radio and television into the hands of the police to protect ourselves against improper thinking."

Among their many other findings, they found that when teenagers rated the sixteen worst things a person could do, the three worst were: 1) killing or murdering; 2) using or selling narcotics; and 3) sexual misbehaving. The study also found that 38% felt there was nothing worse than being considered odd by other people; 50% felt greatly upset if their group didn't approve of them; and 51% tried very hard to do everything that would please their friends.

Are you surprised at this picture of the American teenager? Do you think the same survey given today would have drastically different results? You may be wondering how the researchers got these results in the first place. Whom did they survey? What questions did they ask? Why can they say "over half the teenagers in America?" Did they interview every teenager? Or did they make a conclusion on the basis of a sample of teenagers?

The *SAP* unit is about survey research. It will help you understand how researchers get the results they do, and what those results mean. It will help you develop skills that will allow you to do survey research of your own, so that you can learn directly about the opinions and attitudes of people around you.

Almost every day the newspapers, magazines, and television broadcasts present you with the results of some survey, poll, or study. You may hear that the Gallup poll says that 53% of Americans back Nixon's Vietnam policy; that a local political candidate is the "front runner;" that the use of narcotics among teenagers is increasing; or that 9 out of 10 dentists recommend a particular brand of toothpaste. Up until now, you probably have accepted such statements at face value, without thinking very much about how the results were obtained, and what they really mean.

For example, when an advertisement claims that 9 out of 10 dentists recommend a certain brand of toothpaste, the ad is supposed to make you believe that the brand must be a good one and convince you to buy it. Many people do react this way. The authority carried by a recommendation by dentists convinces them that it must be good, but they do not always know how meaningful that recommendation is. It doesn't take much imagination to think up several situations in which you could honestly say that 9 out of 10 dentists recommended the toothpaste, but in which the endorsement is almost meaningless. For example, you could ask the dentist:

> Which of the following would you recommend for dental brushing care?
>
> 1. sugar
> 2. salt
> 3. *FARAWAY* toothpaste
> 4. water

Certainly you could get 9 of 10 dentists to recommend *FARAWAY* toothpaste under these conditions and you honestly could say that 9 of 10 dentists recommended *FARAWAY*; but you have told only half of the truth. You did not say what the question was. You can easily see that the claim that 9 out of 10 dentists recommend *FARAWAY* really does not have anything to do with the benefits of *FARAWAY* versus any other brand of toothpaste. Of course, it could be that the research behind the ad may well have been valid, but since you don't know all the conditions, you cannot judge whether it is or not. There are many people, however, who accept the ad without question (as some advertisers hope they will), dash out and buy the product, and think that they now won't have such big dentist bills!

Reports which use survey statistics can be very deceiving. You may have heard the saying: "Statistics don't lie, but liars use statistics." Because you are already an American consumer, and because you are becoming an educated citizen, it is important for you to learn to distinguish between sound, helpful research and twisted, deceptive conclusions. You should be able to be critical of a survey study and take into account the conditions of the study when you judge its value. If you are able to do this, you are less likely to be fooled by "researchers" who use statistics to take advantage of people, and you will not have to take statistical results at face value.

As you work on the survey analysis unit in class, you will learn how to conduct a survey research project by actually doing one yourself. This way, you will be able to look at the process from the inside and see how it works.

One special feature of this unit is that you will use the computer as a tool to help you analyze and interpret the results of your survey. You will learn to perform the basic statistical procedures yourself, but once you understand how they are done, you can use the computer to do all the really tedious mathematics for you.

II. BASIC STEPS OF SURVEY RESEARCH

As you work on your survey research project, you will be using many different resource materials. This *STUDENT MANUAL* will not teach you all about the steps in survey research, but it will be especially helpful after you have done your survey and are ready to analyze your results. We have included here a summary of the basic steps used in survey research to give you a preview of what you will be doing, as well as an idea of when you will use the computer. These are the basic steps in the process:

1) Decide on the area to be researched.

2) Develop the hypothesis to be tested, or decide on the characteristics to be measured.

3) Develop a questionnaire and pretest it.

4) Determine the sample and the sampling technique.

5) Collect the data.

6) Enter the data into the computer.

7) Run the computer program.

8) Analyze the computer results.

9) Report the findings.

III. ALL ABOUT THE *SAP* PROGRAM

The number of respondents as well as the number of questions for each one that you can store in the *SAP* program will depend on the storage capacity of the computer you are using. In practical terms, this means there are two possible limitations. These include:

1) The number of respondents.

2) The number of questions stored for each respondent.

Before you conduct your survey, you should consult with someone who knows the capability of your computer to determine what limits you must observe.

A. Preparing the Data for the Computer

In order to avoid unnecessary errors when you enter data from your survey into the computer, you should first code the data from your questionnaires onto the Data Coding Forms provided at the end of this manual. When completed, these forms give you a handy and concise reference to the facts about your data. An example will help explain how to fill out the Data Coding Form. Suppose you had conducted a survey to find out the students' opinions on whether your school should set up a smoking room for students to use during the school day. Four of the completed questionnaires are illustrated below, and we will code the information onto the Data Coding Form.

Questionnaire # 1

STUDENT OPINION SURVEY

1. What grade are you in?

1) 9th (✓)
2) 10th ( )
3) 11th ( )
4) 12th ( )

2. What is your sex?

1) boy ( )
2) girl (✓)

3. Do you think this school should have a smoking room for students to use during the school day?

1) no ( )
2) yes (✓)
3) undecided ( )

Questionnaire # 2

STUDENT OPINION SURVEY

1. What grade are you in?

1) 9th (✓)
2) 10th ( )
3) 11th ( )
4) 12th ( )

2. What is your sex?

1) boy (✓)
2) girl ( )

3. Do you think this school should have a smoking room for students to use during the school day?

1) no (✓)
2) yes ( )
3) undecided ( )

Questionnaire # 3

STUDENT OPINION SURVEY

1. What grade are you in?

1) 9th ( )
2) 10th (✓)
3) 11th ( )
4) 12th ( )

2. What is your sex?

1) boy (✓)
2) girl ( )

3. Do you think this school should have a smoking room for students to use during the school day?

1) no (✓)
2) yes ( )
3) undecided ( )

Questionnaire # 4

STUDENT OPINION SURVEY

1. What grade are you in?

1) 9th ( )
2) 10th ( )
3) 11th (✓)
4) 12th ( )

2. What is your sex?

1) boy (✓)
2) girl ( )

3. Do you think this school should have a smoking room for students to use during the school day?

1) no ( )
2) yes ( )
3) undecided (✓)

On the Data Coding Form, you should first fill in the variables (what each question was about) and the range for each variable. For example:

in question 1, the variable is the *grade* of the respondent;

in question 2, it is the *sex* of the respondent; and

in question 3, it is the respondent's *opinion on smoking room*

Thus, you would fill in *Grade, Sex, and Opinion on Smoking Room* in the spaces provided at the top of the Data Coding Form, as shown in the sample form on the next page. Since the program will handle up to eight variables, there are eight spaces at the top of the form. In this case, you would only use three of the spaces, since you have only three variables.

Now, to understand what to put in the table called *Range for Variables*, you should first notice that in the questionnaire each possible answer for each question was numbered; thus, each answer can be thought of as a number as well as a word. We say that the *range* for each variable is the set of possible values the variable could assume. So, for example, the *range* for variable 1 (which was *Grade*) is the set of numbers 1, 2, 3, 4, corresponding to 9th, 10th, 11th, and 12th grade, respectively. For variable 2 (which was *Sex*), the *range* is the set of numbers 1, 2, corresponding to boy and girl, respectively. Thus, in the chart titled *Range for Variables*, you would enter a low of 1 and a high of 4 for the first variable, and a low of 1 and a high of 2 for the second. Can you see why you would enter a low of 1 and a high of 3 for the third variable, *Opinion on Smoking Room*?

The table of ranges for variables will be especially handy when you are running the program, because the computer always asks for the range of the variable when you state that you want that variable to be used in a table.

DATA CODING FORM

QUESTIONS/VARIABLES

	Grade	Sex	Opinion on Smoking Room					
Respondent's Number	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

NAME: Your name

DATE: The date

CLASS: Your class

SUBJECT: Student Opinion on Smoking Room

RANGE FOR VARIABLES		
Var.	Low	High
1	1	4
2	1	2
3	1	3
4		
5		
6		
7		
8		

Now, to code the actual data, you must examine the questionnaires one by one. The first illustrated questionnaire can be considered that of "respondent number 1." Since this person answered "9th" to the first question, and since "9th" is the response numbered "1", you would enter "1" in the space in the table that is in the row for respondent 1, and the column for "Grade."

Likewise, you would enter "2" in the space that is in the row for respondent 1 and the column for "Sex", because respondent 1 answered "female" and "female" is the response numbered "2". Examine the entries in the form below and be sure that you understand how each entry was made. Refer back to page 4 to see the questionnaires.

DATA CODING FORM

QUESTIONS/VARIABLES

	Grade	Sex	Opinion on Smoking Room					
Respondent's Number	1	2	3	4	5	6	7	8
1	1	2	2					
2	1	1	1					
3	2	1	1					
4	3	1	3					
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

NAME: Your name

DATE: The date

CLASS: Your class

SUBJECT: Student Opinion on Smoking Room

RANGE FOR VARIABLES

Var.	Low	High
1	1	4
2	1	2
3	1	3
4		
5		
6		
7		
8		

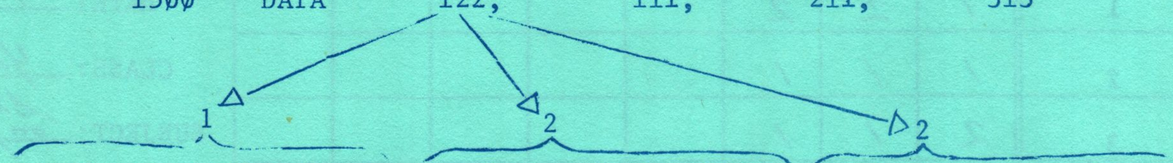
Once you have recorded your data on the coding form, it will be a very simple matter for you to enter your data on the computer and run the program. Your survey data will be entered as data lines for the computer program. Lines 1500 - 1900 of the *SAP* program have been reserved for data entry. The answers of each respondent will be entered as a block of numbers. Each number in the block represents that respondent's answer to a particular question. When you enter the data, each block of numbers should be followed by a comma, except when the block is the last to be entered in a data line. If the data involves the maximum number of variables (8), up to five blocks of numbers can be entered in a data line. If fewer variables are used, then more number blocks can be entered on one line. Thus, if you were to enter the data coded on the form on page 7, you would enter:

```
1500 DATA  122, 111, 211, 313
```

Of course, in most cases you would have many more blocks of numbers, since you would have more respondents.

A closer look at one number block will make the meaning of the entry perfectly clear to you. We will look at the first number block "122".

```
1500    DATA        122,          111,          211,          313
```



number code for first respondent's answer to question 1 ("1" means "9th grade")

number code for first respondent's answer to question 2 ("2" means "girl")

number code for first respondent's answer to question 3 ("2" means "yes")

Notice that commas are not used within a block. They are used only to separate entire blocks of numbers.

Usually, you will need more than one data line. The data lines should be numbered consecutively, beginning with 1500. Thus, you might have:

1500 DATA ______, ______, ______, ______, ______

1501 DATA ______, ______, ______, ______, ______

1502 DATA ______, ______, ______, ______, ______

1503 DATA ______, ______, ______, ______, ______

:

etc.

Occasionally you may notice a slight error in the totals in a table. This is a roundoff error, and you may disregard it.

Your coding form will be a handy reference for you when you are working at a teletype. You have the "names and numbers" of all of your variables, a table which gives you the range for each variable, and a summary of the survey data. When the computer asks you to specify variables or the range of a variable, you will be able to quickly respond.

B. What the Program Will Do

After you have entered your data, you can have the computer do several things with it. The computer will:

1. Compute the mean and standard deviation for any variable. (With OPTIONS 1 through 5 you have a Recode Option.)
2. Construct a table of observed frequencies for any two variables, compute chi square, degrees of freedom (df), and allow the user to calculate the correlation coefficient gamma if desired.
3. Construct a table of observed frequencies by row percentages for any two variables.
4. Construct a table of observed frequencies by column percentages for any two variables.
5. Construct a table of expected frequencies for any two variables.
6. Stop the program.

If a minus sign (-) is typed before the option number, the program will use previously stored data to make its calculations. For example, if the user selects OPTION 2, he will be asked to name two variables; then the program will make the calculations and print the results using these variables. If the same two variables are to be used with another option, the user should type " - " and then the option number. This will cause the same two variables to be used in the calculation and will save considerable time by not having the machine re-read the data from data line storage. We suggest that you become familiar with this option, since it will save you time.

C. Understanding Your Options

(This section illustrates the use of the options contained in the *SAP* program. It contains all the information necessary for you to begin to use the program.)

Your response or input on the sample output is *underlined*.

Suppose you conduct in your high school the Student Opinion Survey mentioned earlier. You ask 80 students to fill out the questionnaire. 20 of the students you ask to fill in the questionnaire are 9th graders, 20 are in the 10th grade, 20 are juniors and 20 are seniors. After the questionnaires have been filled out and returned to you, you enter the answers into the Data Lines and begin your analysis.

Before you begin your data analysis you are asked to indicate the total number of variables you have included in your data. Your response will range between 1 and 8 depending on the number of variables used in your study.

OPTION 1

First, you want to get a general picture of your results. How many girls answered the questionnaire? How many boys? How many students favored the smoking room? You answer these questions by requesting OPTION 1. After you request OPTION 1, you are asked several questions. First, you are asked for the number of the variable you want to examine. If you wish to examine the variable labeled Sex, you type a "2". Next, you are asked if you want to recode this variable. (This option will be explained below.) Note, however, that since you do not wish to recode at this point, you simply type "0" after the "?". You will also be asked for the range of the variable. As you will remember, the range is the set of possible values the variable could assume. Thus, Variable 1 has a range of 4.

After you have given this information to the computer, you will be given the results. OPTION 1 gives you the total, the mean and the standard deviation for the variable requested. (For an explanation of these terms, see the *RESOURCE MANUAL*.)

```
                    SURVEY ANALYSIS PROGRAM

HOW MANY VARIABLES ?3

OPTION   ?1

VARIABLE ?1
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  1  ?0

RANGE OF VAR.  1  ?1,4

VALUE  NO.
   1   20
   2   20
   3   20
   4   20
TOTAL  80

MEAN =  2.5
S.D. =  1.1


OPTION   ?1

VARIABLE ?2
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  2  ?0

RANGE OF VAR.  2  ?1,2

VALUE  NO.
   1   39
   2   41
TOTAL  80

MEAN =  1.5
S.D. =  0.5


OPTION   ?1

VARIABLE ?3
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  3  ?0

RANGE OF VAR.  3  ?1,3

VALUE  NO.
   1   44
   2   35
   3   1
TOTAL  80

MEAN =  1.5
S.D. =  0.5
```

Recode

After you select your option and indicate which variable or variables you wish to look at, you will be given the opportunity to recode your data. Recoding simply means "regrouping" your data. The following example will illustrate this point. Suppose you want to examine all 9th and 10th graders as one group, and all 11th and 12th graders as another group. The printout below illustrates how this is done using the Recode option.

To begin, you indicate you want to recode 2 values into 1 (9th and 10th graders into one group). The computer will then ask what the old values were. In this case, you put all 9th graders whose old value was 1 and all 10th graders whose old value was 2 into a new group. The value or label for the new group containing 9th and 10th graders you assign as 1. You do the same thing for the juniors and seniors. You assign a new group the value or label 2 and put all 11th and 12th graders into this group.

When you have completed all the recoding you want to do, type a "0" after the "?". This informs the computer that you do not wish to do any further recoding.

```
OPTION  ?1

VARIABLE ?1
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  1   ?2
RECODED NEW VALUE ?1
          OLD VALUE ?1
          OLD VALUE ?2
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  1   ?2
RECODED NEW VALUE ?2
          OLD VALUE ?3
          OLD VALUE ?4
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  1   ?0

RANGE OF VAR.  1   ?1,2

VALUE  NO.
    1  40
    2  40
TOTAL  80

MEAN =   1.5
S.D. =   0.5
```

OPTION 2

OPTION 2 constructs a table of observed frequencies for any two variables. The table tells you how many persons in each category for the first variable responded with each category for the second variable.

Suppose we would like to know how the responses of the boys who were questioned differed from the responses of the girls. To get this information, request OPTION 2; the computer will construct a table of observed frequencies for the two variables, Sex (Variable 2) and Opinion on Smoking Room (Variable 3). The example below illustrates how this is done.

```
OPTION  ?2

VARIABLES  ?2,3
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  2   ?0

NUMBER OF VALUES TO BE RECODED FOR VARIABLE  3   ?0

RANGE OF VAR.  2  ?1,2
RANGE OF VAR.  3  ?1,2


OBSERVED FREQUENCIES
(ROW: VAR.  2 , COLUMN: VAR.  3 )


      1      2    TOTALS


 1   29     10     39

 2   15     25     40

TOTALS

     44     35      79

CHI SQUARE=  10.9  DF=  1
CALCULATE GAMMA(1=YES, 0=NO) ?1
GAMMA =  0.65
```

At first glance, this table probably doesn't mean much to you. Nevertheless, go ahead and label the table.

```
OPTION  ?2

VARIABLES  ?2,3
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  2  ?0

NUMBER OF VALUES TO BE RECODED FOR VARIABLE  3  ?0
RANGE OF VAR.  2  ?1,2
RANGE OF VAR.  3  ?1,2


OBSERVED FREQUENCIES
(ROW: VAR.  2 , COLUMN: VAR.  3 )

              OPINION ON SMOKING ROOM

                NO      YES
                 1       2     TOTALS

       BOYS 1   29      10       39
SEX
      GIRLS 2   15      25       40

          TOTALS

                44      35       79

          CHI SQUARE=  10.9  DF=  1
          CALCULATE GAMMA(1=YES, 0=NO) ?1
          GAMMA =  0.65
```

In the tables above, Variable 2 is categorized in the rows; Variable 3 is categorized in the columns. Referring back to the Data Coding Form, you will recall that Variable 2 is Sex, and Variable 3 is Opinion on Smoking Room. The numbers 1 and 2 at the top of the columns refer to the answers for Question 3; the numbers 1 and 2 at the left of the rows refer to the possible answers for Variable 2.

(You will notice that the *No Opinion* category (3) on Variable 3 has been omitted from the analysis. Normally, the *Don't Know* and *No Opinion* responses are omitted from the analysis.)

Once you have labeled the table, you can begin to draw some conclusions. For example, the data suggests that the boys tend to oppose the smoking room, while the girls seem to favor it.

OPTION 3 and OPTION 4

Sometimes it is difficult to interpret and understand a table of observed frequencies just by looking at the "raw" numbers. It is often helpful to have the observed frequencies converted into percentages. For example, it is easier to understand the statement: "50 per cent of the citizens interviewed felt that the Mayor was doing a good job," than it is to understand the statement: "68 people out of 136 interviewed felt that the Mayor was doing a good job." Percentages are helpful in understanding "raw" data. OPTION 3 computes row percentages; OPTION 4 computes column percentages.

```
OPTION  ?3

VARIABLES  ?1,2
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  1  ?0

NUMBER OF VALUES TO BE RECODED FOR VARIABLE  2  ?0

RANGE OF VAR.  1  ?1,4
RANGE OF VAR.  2  ?1,2


OBSERVED FREQUENCIES BY ROW PERCENTAGES
(ROW: VAR.  1 , COLUMN: VAR.  2 )


        1     2    TOTALS


  1    40    60    100

  2    50    50    100

  3    60    40    100

  4    45    55    100
```

```
OPTION  ?4

VARIABLES  ?1,2
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  1  ?0

NUMBER OF VALUES TO BE RECODED FOR VARIABLE  2  ?0

RANGE OF VAR.  1  ?1,4
RANGE OF VAR.  2  ?1,2


OBSERVED FREQUENCIES BY COLUMN PERCENTAGES
(ROW: VAR.  1 , COLUMN: VAR.  2 )


         1      2

 1      20.5   29.3

 2      25.6   24.4

 3      30.8   19.5

 4      23.1   26.8

TOTALS

        100    100
```

The above printout illustrates the use of OPTIONS 3 and 4. The number in the circle under OPTION 3 tells you that 40 per cent of the 9th graders are boys. The number in the rectangle under OPTION 4 tells you that 29.3 per cent of the girls in the high school are in the 9th grade.

When interpreting percentages, it is often very easy to make a mistake. Practice on these two tables; BE VERY CAREFUL. Can you define the meaning of all the percentages in the tables?

OPTION 5

OPTION 5 constructs a table of expected frequencies (as opposed to observed frequencies) for any two variables. (See *RESOURCE MANUAL* for a more detailed discussion.)

When you judge the value of your survey data, you will want to know how likely it is that the results you got in your survey were due to chance alone. That is, how likely it is, in your high school survey, that the girls would favor the smoking room and the boys would not. A table of expected frequencies will tell you what your results would probably have been, if there really were no differences between the sub-groups in your sample. You can then compare these expected frequencies with the observed frequencies.

```
OPTION  ?5

VARIABLES  ?1,2
NUMBER OF VALUES TO BE RECODED FOR VARIABLE  1  ?0

NUMBER OF VALUES TO BE RECODED FOR VARIABLE  2  ?0

RANGE OF VAR.  1  ?1,4
RANGE OF VAR.  2  ?1,2


EXPECTED FREQUENCIES
(ROW: VAR.  1 , COLUMN: VAR.  2 )


        1      2    TOTALS


 1     9.8   10.3    20

 2     9.8   10.3    20

 3     9.8   10.3    20

 4     9.8   10.3    20

TOTALS

      39     41      80
```

If you compare this table with the table of observed frequencies on Page 13, you will see that they vary considerably. This indicates that the results you found in your high school are probably not due to chance, that there are real differences between the boys and girls on the question of the smoking room.

OPTION 6

OPTION 6 stops the program. When you are finished, use it to halt the program.

SUMMARY

These various options give you a wide range of possible ways to analyze your data. Once you decide on the types of information you want about your data, you can use the computer as a tool to produce the information. And since you don't have to do any of the mathematics involved, you can have the freedom to explore your data in many different ways.

IV. DATA CODING FORM

DATA CODING FORM

QUESTIONS/VARIABLES

Respondent's Number	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

NAME: ____________________

DATE: ____________________

CLASS: ____________________

SUBJECT: ____________________

RANGE FOR VARIABLES		
Var.	Low	High
1		
2		
3		
4		
5		
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DATA CODING FORM

QUESTIONS/VARIABLES

Respondent's Number	1	2	3	4	5	6	7	8
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NAME: ____________________

DATE: ____________________

CLASS: ____________________

SUBJECT: ____________________

RANGE FOR VARIABLES

Var.	Low	High
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DATA CODING FORM

QUESTIONS/VARIABLES

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